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PTO/SB/17 (02-07)

Approved for use through 02/28/2007. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Effective on 12/08/2004.

Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL

For FY 2007

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 400.00

Complete if Known

Application Number	09/815,376
Filing Date	March 21, 2001
First Named Inventor	Garry Holcomb
Examiner Name	Gregory J. Strimbu
Art Unit	3634
Attorney Docket No.	16458-050 (MKSI.50USU1)

METHOD OF PAYMENT (check all that apply)

- ☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____
- ☒ Deposit Account Deposit Account Number: 501491 Deposit Account Name: Cochran Freund & Young
- For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)
- ☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee
- ☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180
Total Claims	Extra Claims	Fee (\$)
- 20 or HP = _____ x _____ = _____		
HP = highest number of total claims paid for, if greater than 20.		
Indep. Claims	Extra Claims	Fee (\$)
- 3 or HP = _____ x _____ = _____		
HP = highest number of independent claims paid for, if greater than 3.		

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
- 100 = _____ / 50 = _____ (round up to a whole number) x _____ = _____				

4. OTHER FEE(S)

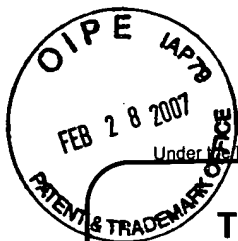
Non-English Specification, \$130 fee (no small entity discount) Fees Paid (\$)

Other (e.g., late filing surcharge): Petition fee required under 37 CFR 1.17(f) 400.00

SUBMITTED BY		
Signature	Registration No. (Attorney/Agent) 27,847	Telephone 970-492-1100
Name (Print/Type) James R. Young	Date 2/28/07	

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

94

Application Number	09/815,376
Filing Date	March 21, 2001
First Named Inventor	Garry Holcomb
Art Unit	3634
Examiner Name	Gregory J. Strimbu
Attorney Docket Number	16458-050 (MKS1.50USU1)

ENCLOSURES (Check all that apply)

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> Fee Transmittal Form
<input checked="" type="checkbox"/> Fee Attached
<input type="checkbox"/> Amendment/Reply
<input type="checkbox"/> After Final
<input type="checkbox"/> Affidavits/declaration(s)
<input type="checkbox"/> Extension of Time Request
<input type="checkbox"/> Express Abandonment Request
<input type="checkbox"/> Information Disclosure Statement

<input type="checkbox"/> Certified Copy of Priority Document(s)
<input type="checkbox"/> Reply to Missing Parts/
Incomplete Application
<input type="checkbox"/> Reply to Missing Parts
under 37 CFR 1.52 or 1.53 | <input type="checkbox"/> Drawing(s)
<input type="checkbox"/> Licensing-related Papers
<input checked="" type="checkbox"/> Petition
<input type="checkbox"/> Petition to Convert to a
Provisional Application
<input type="checkbox"/> Power of Attorney, Revocation
Change of Correspondence Address
<input type="checkbox"/> Terminal Disclaimer
<input type="checkbox"/> Request for Refund
<input type="checkbox"/> CD, Number of CD(s) _____
<input type="checkbox"/> Landscape Table on CD | <input type="checkbox"/> After Allowance Communication to TC
<input type="checkbox"/> Appeal Communication to Board
of Appeals and Interferences
<input type="checkbox"/> Appeal Communication to TC
(Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Status Letter
<input checked="" type="checkbox"/> Other Enclosure(s) (please identify
below):
- Supplemental Application Data Sheet
- Certificate of Correction
- Return postcard |
|--|---|---|

Remarks

PETITION UNDER 37 CFR 1.183 OR, ALTERNATIVELY, PETITION UNDER 37 CFR 1.78(a)(3)

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	COCHRAN FREUND & YOUNG		
Signature			
Printed name	James R. Young		
Date	February 28, 2007	Reg. No.	27,847

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature			
Typed or printed name	Andrea Sims	Date	2-28-07

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Holcomb et al.	Examiner: Gregory J. Strimbu
Serial No.: 09/815,376	Group Art Unit: 3634
Filed: March 21, 2001	
For: COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL	Docket No. 16458-050 (MKSI.50USU1)

Mail Stop Petitions
Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

ATTN: Frances Hicks
Office of Petitions

**PETITION UNDER 37 CFR 1.183 TO SUSPEND 37 CFR 1.78(a)(6) TO THE
EXTENT IT MAY BE CONSTRUED TO ALLOW SUBMISSION OF THE
REFERENCE REQUIRED BY PARAGRAPH (a)(5) TO BE ACCEPTED ONLY
“DURING THE PENDENCY OF THE LATER FILED APPLICATION” IN ORDER
TO ACCEPT POST ISSUANCE AN UNINTENTIONALLY DELAYED
SUPPLEMENTAL APPLICATION DATA SHEET SHOWING THE SPECIFIC
REFERENCE TO PROVISIONAL APPLICATION UNDER 35 USC 119(e), WHERE
THE PRIORITY CLAIM IS ALREADY CONTAINED IN THE APPLICATION IN A
MANNER THAT MEETS THE REQUIREMENTS OF 35 USC 119(e), AND
WITHOUT REQUIRING A PETITION UNDER 37 CFR 1.78(a) AND SURCHARGE
UNDER 37 CFR 1.17(t)**

OR, ALTERNATIVELY,

**PETITION UNDER 37 CFR 1.78(a)(3) TO ACCEPT UNINTENTIONALLY
DELAYED CLAIM FOR THE BENEFIT OF A PRIOR-FILED APPLICATION
UNDER 35 USC 120**

These petitions are made in the alternative because of the particular facts involved:

A.) In the first Office Action, the Examiner in this application explicitly acknowledged the applicant's claim for domestic priority under 35 U.S.C. § 119(e) to a provisional application. (See Exhibit J).

B.) The specific reference to the provisional application by correct serial number (60/191,223) and filing date (3/22/00) was contained in the application within the time period during the pendency of the application as required by statute, 35 U.S.C. § 119(e), and as set forth in 37 CFR 1.78(a). Specifically, the statute, 35 U.S.C. § 119(e), only requires that “the application for patent . . . contains . . . a specific reference to the provisional application”, and this application contained the specific reference on its filing date, which is within the time required by 37 CFR 1.78(a). Therefore, the statutory requirement for the domestic priority claim under 35 U.S.C. § 119(e) was met.

C.) However, the specific reference to the provisional application was not in the particular place in this application as required by Patent Office rule in 37 CFR 1.78(a)(5)(iii), i.e., not in either an application data sheet (ADS) or in the first line of the specification after the title. Instead, the priority claim to the provisional application was in the transmittal letter (Exhibit C) and in the Declaration (Exhibit E), and it was shown in both the first and second Filing Receipts (Exhibits D and H). It was also shown on the face of the published patent application (Exhibit I). Therefore, the reference to the provisional application was clearly submitted and “contained in the application”, as required by statute, but it was not in the place required by the rule. Therefore, suspension of the rule in 37 CFR 1.78(a)(6) to accept an application data sheet with the specific reference now, after the patent has been issued, would not violate the statute, 35 U.S.C. § 119(e), and the facts recited below show why it would be appropriate and just to grant such relief in this case.

D.) Being aware of the applicant’s priority claim in this application, the Examiner had an obligation as required by M.P.E.P. 201.11 III. E. to notify the applicant with either form paragraph 2.15 or 2.16. M.P.E.P. 201.11 III. E. provides as follows:

“If the examiner is aware of the fact that an application is a continuing application of a prior application or the applicant fails to submit the reference to the prior application in compliance with 37 CFR 1.78(a) (e.g., **the reference was submitted in the transmittal letter** but not in the first sentence(s) of the specification or in an application date sheet), **he or she should merely call attention to this in an Office action** by using the wording of form paragraphs 2.15 or 2.16.” [emphasis added]

Form paragraphs 2.15 and 2.16 in M.P.E.P. 201.11 III. E. provide:

“If the reference to the prior application was previously submitted within the time period set forth in 37 CFR 1.78(a), but not in the first sentence(s) of the specification or an application data sheet (ADS) as required by 37 CFR 1.78(a), (e.g., if the reference was submitted in an oath or declaration or the application transmittal letter), and the information concerning the benefit claim was recognized by the Office as shown by its inclusion on the first filing receipt, the petition under 37 CFR 1.78(a) and the surcharge under 37 CFR 1.17(t) are not required. Applicant is still required to submit the reference in compliance

with 37 CFR 1.78(a) by filing an amendment to the first sentence(s) of the specification or an ADS.” [emphasis added]

E.) However, in spite of the Examiner’s explicit acknowledgment of the applicant’s priority claim to the provisional application in the first Office Action, Paper No. 4 (Exhibit J), he did not provide the notice to the applicant as required by M.P.E.P. 201.11 III. E. Consequently, neither the applicant nor the Examiner addressed this issue again during the remainder of the examination, and the patent issued without showing the priority claim on the front page of the patent.

F.) The applicants are aware of the provision in 35 U.S.C. 119(e) which provides that the Director may establish procedures, including the payment of a surcharge, to accept an unintentionally delayed submission of an amendment under this subsection, i.e., for the application to be “amended to contain a specific reference to the provisional application”, during the pendency of the application, and of the consequent statement in the M.P.E.P. 1481.03 to the effect that a Certificate of Correction is not a valid mechanism for adding or correcting a priority claim under 35 U.S.C. § 119(e) after a patent has been granted. However, neither of those provisions is applicable in this case, because neither the priority claim itself nor the specific reference has to be added to the application or corrected. On the contrary, the specific reference to the provisional application is already contained in the patent application as required by the statute and as acknowledged by the Examiner, and it already refers to the correct provisional patent application by correct serial number and correct filing date. The correct specific reference was simply not placed in the preferred place (specification or ADS) in the application as required by rule (not statute – the statute says only that the specific reference has to be contained in the application, not necessarily in the specification or in the ADS), and the Examiner failed to inform the applicant of that rule requirement as he was supposed to do according to M.P.E.P. 201.11 III. E.

G.) This conclusion that the priority claim in this case was already contained in the application within the time period required by 37 CFR 1.78(a) and does not need to be added or corrected is clear from two provisions in the MPEP. First, MPEP 201.11 III. F. provides as follows:

The Office plans to notify applicants on or with the filing receipt that a benefit claim was improper but applicants are advised that only the benefit claims that are listed on the filing receipt have been recognized by the Office. Therefore, applicants should carefully and promptly review their filing receipts in order to avoid the need for a petition (37 CFR 1.78(a)(3) or (a)((6)) and the surcharge.

If a benefit claim is added after the time period required by 37 CFR 1.78(a), a petition and the surcharge are required. [emphasis added].

It is clear from the above quoted MPEP 201.11 III. F., therefore, that only benefit claims added to the application after the time period required by 37 CFR 1.78(a) require a petition and surcharge. Then, as to whether the benefit claim in this case was already timely

contained in the application and does not need the petition and surcharge to add it, the above quote from MPEP 201.11 III. F. is clarified by the statement in form paragraphs 2.15 and 2.16 (M.P.E.P. 201.11 III. E.), as follows:

“If the reference to the prior application was previously submitted within the time period set forth in 37 CFR 1.78(a), but not in the first sentence(s) of the specification or an application data sheet (ADS) as required by 37 CFR 1.78(a), (e.g., if the reference was submitted in an oath or declaration or the application transmittal letter), and the information concerning the benefit claim was recognized by the Office as shown by its inclusion on the first filing receipt, the petition under 37 CFR 1.78(a) and the surcharge under 37 CFR 1.17(t) are not required. Applicant is still required to submit the reference in compliance with 37 CFR 1.78(a) by filing an amendment to the first sentence(s) of the specification or an ADS.” [emphasis added]

Therefore, it is clear from MPEP 201.11 III. F. and M.P.E.P. 201.11 III. E. that the benefit claim in this case was clearly **already contained in this application within the time period set forth in 37 CFR 1.78(a)**, and it already recited the correct serial number and filing date of the provisional application from which priority is claimed. Consequently, the priority claim in this case does not need to be added to the application now, and it does not need to be corrected, so the limitation in 35 U.S.C. 119(e) of amending an application to contain a specific reference only during the pendency of the application and the corollary prohibition in M.P.E.P. 1481.03 to the effect that a Certificate of Correction is not a valid mechanism for adding or correcting a priority claim under 35 U.S.C. § 119(e) after a patent has been granted are both not applicable to this case.

H.) In this case, the already present and correct priority claim was simply not in the place in the application as required by rule, and it was not printed on the face of the issued patent after being acknowledged by the Examiner. Since it is a Patent Office rule, not the statute, that requires a certain placement of the reference in the application, i.e., first line of the specification or in an ADS, and since the Examiner failed to provide a notice of that rule to the applicants as he was required to do by M.P.E.P. 201.11 III. E, it would appear to be a simple matter and appropriate in this case to accept the enclosed application data sheet to put the already correct priority claim to the provisional application under 35 USC 119(e) contained in this application onto a ADS form without requiring a petition under 37 CFR 1.78(a) and surcharge under 37 CFR 1.17(t).

I.) A Supplemental Application Data Sheet 37 CFR 1.76 (Form PTO/SB/14 (08-05)) with the reference to the provisional application is enclosed. The petition fee required under 37 CFR 1.17(f) for this petition under 37 CFR 1.183 is also enclosed. The entire delay between the date the specific reference of the priority date in an application data sheet under 37 CFR 1.78(a)(5)(iii) was due and the date the specific reference on the enclosed application data sheet is filed was unintentional.

J.) The facts and accompanying exhibits recited in the statement below support this request.

K.) **IN THE ALTERNATIVE**, if the petition above under 37 CFR 1.183 is not granted, then applicants hereby petition for acceptance of an unintentionally delayed claim under 35 U.S.C. 120 for benefit of a prior-filed application. This petition is made under 37 CFR 1.78(a)(3). The reference required by 35 U.S.C. 120 is enclosed on a Certificate of Correction (Form PTO/SB/44 (04-05)). The petition fee required under 37 CFR 1.17(t) for this petition under 37 CFR 1.78(a)(3) is also enclosed. The entire delay between the date the claim was due under 37 CFR 1.78(a)(2)(ii) and the date the claim is filed was unintentional.

L.) As support for the alternative petitions above, the applicants also submit the following:

1. Applicants filed a provisional application, entitled "Combination and differential pressure transducer for load lock control", on March 22, 2000 (**Exhibit A**). The filing fee for the provisional application was paid, and a Filing Receipt (**Exhibit B**) was issued by the Patent and Trademark Office on May 9, 2000, showing the assigned application number 60/191,223.

2. The applicants filed the above-identified non-provisional application on March 21, 2001, with missing parts, including a transmittal letter (**Exhibit C**) to the Assistant Commissioner for Patents filed on the filing date, which stated, "**This application is a non-provisional of provisional application Serial Number 60/191,223, filed on March 22, 2000.**"

3. A Filing Receipt (**Exhibit D**) was issued by the Patent and Trademark Office on May 15, 2001, which included the entry under Domestic Priority data as claimed by applicant: "**THIS APPLN CLAIMS BENEFIT OF 60/191,223 03/22/2000**".

4. In response to the Notice to File Missing Parts of Nonprovisional Application, dated May 15, 2001, applicants filed, *inter alia*, a DECLARATION FOR PATENT APPLICATION (Form PTO/SB/01 (11-90)) (**Exhibit E**), signed by the inventors, which stated, *inter alia*:

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT International filing date of this application.

60/191,223

3/22/00

Pending

(Application Number)

(Filing Date)

(Status – patented,
pending, abandoned)

5. The Transmittal Form PTO/SB/21 (08-00) under which the Declaration was filed includes a Certificate of Mailing dated June 18, 2001 (**Exhibit F**) and post card receipt date stamped in the Patent and Trademark Office on June 21, 2001 (**Exhibit G**), thereby showing that the Declaration for Patent Application with the reference to the prior-filed application was filed in this patent application by June 21, 2001, i.e., within four months after the filing date of this application.

5. An Updated Filing Receipt (**Exhibit H**) was issued by the Patent and Trademark Office on July 12, 2001, which included the entry under Domestic Priority data as claimed by applicant: **“THIS APPLN CLAIMS BENEFIT OF 60/191,223 03/22/2000”**.

6. This patent application was published pursuant to 37 CFR 1.211, et seq., Pub. No. US 2001/0029889 A1, on October 18, 2001, with the following entry on the front page of the publication (**Exhibit I**) under the heading of **Related U.S. Application Data**: **“Non-provisional of provisional application No. 60/191,223, filed on Mar. 22, 2000.”**

7. However, this non-provisional application was not filed with an application data sheet and it did not include a specific reference to the prior-filed application in the first sentence(s) following the title of the specification.

8. In the first Office Action, Paper No. 4, dated March 24, 2003 (**Exhibit J**), the Examiner acknowledged the domestic priority claim by checking box no. 14 in the Office Action Summary, which states as follows: **“Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).”**

9. However, the Examiner did not follow M.P.E.P. 201.11 III. E., which provides as follows:

“If the examiner is aware of the fact that an application is a continuing application of a prior application or the applicant fails to submit the reference to the prior application in compliance with 37 CFR 1.78(a) (**e.g., the reference was submitted in the transmittal letter** but not in the first sentence(s) of the specification or in an application data sheet), **he or she should merely call attention to this in an Office action** by using the wording of form paragraphs 2.15 or 2.16.” [emphasis added]

Form paragraphs 2.15 and 2.16, last paragraph in each, provide as follows:

“If the reference to the prior application was previously submitted within the time period set forth in 37 CFR 1.78(a), but not in the first sentence(s) of the specification or an application data sheet (ADS) as required by 37 CFR 1.78(a), (e.g., if the reference was submitted in an oath or declaration or the application transmittal

letter), and the information concerning the benefit claim was recognized by the Office as shown by its inclusion on the first filing receipt, the petition under 37 CFR 1.78(a) and the surcharge under 37 CFR 1.17(t) are not required. Applicant is still required to submit the reference in compliance with 37 CFR 1.78(a) by filing an amendment to the first sentence(s) of the specification or an ADS.” [emphasis added]

10. If the Examiner had included the Form 2.15 or 2.16 notice according to M.P.E.P. 201.11 III. E. in the first or any subsequent Office action, the applicants would surely have responded with an amendment in the first line of the specification or with a Supplemental Application Data Sheet to comply with 37 CFR 1.78(a). However, the rule requiring the specific reference to be in the application data sheet or in the first sentence of the specification after the title went into effect less than four months before this application was filed and applicant’s attorney was unaware of it at the time, so, with the Examiner’s explicit acknowledgment of the domestic priority claim in the first Office action, as explained in paragraph 8 above, and because of his failure to include the form paragraph 2.15 or 2.16 according to M.P.E.P. 201.11 III. E. in the first or any subsequent Office action to call the applicant’s attention to the requirement for inclusion of the reference to the prior application in the specification or in an application data sheet, applicants believed the priority claim to the provisional application had been perfected and no further attention was given to this issue by either the Examiner or the applicants during the remaining prosecution of this patent application, and it issued as United States Patent No. U.S. 7,076,920 on July 18, 2006.

11. In January 2007, the applicants’ attorney noticed that the front page (page 1) of the issued patent did not have the Related U.S. Application Data with a reference to the prior-filed application, as was included on the first page of the published patent application (see paragraph 6 above). Further investigation then revealed that references to the prior-filed application were included in the Transmittal Letter (Exhibit C) and in the Declaration for Patent Application (Exhibit E), but not in the specification or in an application data sheet. Further legal research and study, including numerous calls to the Patent Office, including the Examiner, the Office of Legal Administration, and the Petitions Office lead to the preparation and filing of these petitions.

M.) The statutes U.S.C. §§ 119(e) and 120, both provide that the Director may establish procedures, including the payment of a surcharge, to accept unintentionally delayed submission of an amendment under that subsection or section. The provision in M.P.E.P. 201.11 III. E. that examiners should notify the applicant of the rule requirement for the reference if missing and to do so with the wording of form paragraphs 2.15 or 2.16 is a part of such procedures established by the Director toward that end. The failure of the Patent Office to follow those M.P.E.P. 201.11 III. E. procedures in this case contributed to the specific reference for the priority claim not getting placed on one of the specific documents required by the Director’s rule in 37 CFR 1.78(a), and it probably also contributed to the applicant’s domestic priority claim not getting printed on the first sheet of the issued patent, as it should have been, after it was specifically acknowledged by the Examiner as being contained in the application.

N.) The last paragraph in form paragraphs 2.15 and 2.16 (quoted in paragraph 9 above) to the effect that neither a petition under 37 CFR 1.78(a) nor a surcharge under 37 CFR 1.17(t) are required, when the required reference was submitted in an oath or declaration or the application transmittal letter and the information concerning the benefit claim was recognized by the Office as shown by its inclusion on the first filing receipt (all of which applies in this case), also appears to be an explicit acknowledgment by the Patent Office that a priority claim made in that manner does comply with the requirement in the statutes, 35 U.S.C. §§ 119(e) and 120, as being already **contained in the application within the time period during the pendency of the application** as required by the Director. Therefore, the applicants' claim for domestic priority under 35 U.S.C. § 119(e) to a provisional application, as explicitly acknowledged by the Examiner, was **contained in the application within the time period during the pendency of the application** and needs no correction itself. No petition to amend the reference into the application to meet the requirements of U.S.C. §§ 119(e) is required when the facts show that the Patent Office knew and recognized that the reference was already contained in the application during its pendency and within the time period required by the Director. The Examiner should have notified the applicants to also submit an application data sheet with the reference or an amendment of the reference into the first sentence of the specification, as provided in M.P.E.P. 201.11 III. E., but he did not do so. Instead, he specifically acknowledged the applicant's claim for domestic priority under 35 U.S.C. § 119(e) to a provisional application and let it go at that. Therefore, the Patent Office should have printed the domestic priority claim to the provisional patent application under 35 U.S.C. § 119(e) on the front of the issued patent. Having failed to do so, it is now the responsibility of the Patent Office to correct that printing error, which is not the same thing as adding or correcting of the priority claim itself.

O.) If the applicant's petition under 37 CFR 1.183 to suspend the rule in 37 CFR 1.78(a)(6) and accept the enclosed application data sheet with a specific reference to the provisional application and to print the priority claim under 35 U.S.C. 119(e) on the issued patent is not granted, then, in the alternative, applicant requests that the priority claim to the provisional application under 35 U.S.C. 120 be added by the enclosed Certificate of Correction. In this regard, the M.P.E.P. 201.11 III.B. provides as follows:

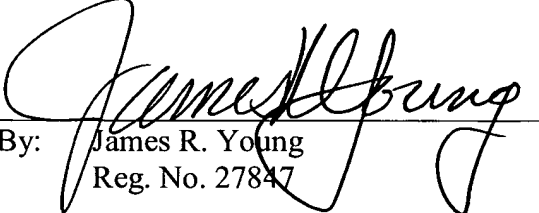
Although **35 U.S.C. 120 does not preclude a benefit claim to a provisional application**, it is not recommended that applicants claim the benefit to a provisional application under 35 U.S.C. 120 since such a claim could have the effect of reducing the patent term, as the term of the patent issuing from such an application may be measured from the filing date of the provisional application pursuant to 35 U.S.C. 154(a)(2). [emphasis added].

WHEREFORE, the applicants respectfully request that the Patent Office accept in this application the enclosed application data sheet showing the applicant's domestic priority claim to the provisional patent application under 35 U.S.C. § 119(e), which has already been acknowledged by the Examiner. The applicants do not believe a petition under 37 CFR 1.78(a) or a fee under 37 CFR 1.17(t) should be required for this action for the reasons

explained above, but the fee under 37 CFR 1.17(f) for this petition under 37 CFR 1.183 can be charged to the applicant's attorneys' deposit account according to the enclosed Fee Transmittal For FY 2007 (PTO/SB/17(02-07)). Also, if it is determined that the enclosed Supplemental Application Data Sheet can be accepted in the circumstances of this case under 37 CFR 1.183, but by petition and fee under 37 CFR 1.78(a)(6), then the required fee under 37 CFR 1.17(t) for petition under 37 CFR 1.78(a)(6)(ii) can be charged to the applicant's attorneys account according to the enclosed Fee Transmittal For FY 2007 (PTO/SB/17(02-07)). **In the alternative**, the applicants respectfully request the Patent Office to accept the enclosed Certificate of Correction showing the applicant's claim for priority to the provisional application under 35 U.S.C. 120, for which case the required fee under 37 CFR 1.17(t) for petition under 37 CFR 1.78(a)(3) can be charged to the applicant's attorneys account according to the enclosed Fee Transmittal For FY 2007 (PTO/SB/17(02-07)).

Respectfully submitted,

COCHRAN FREUND & YOUNG, LLC
Attorney for applicants

By: 
James R. Young
Reg. No. 27847

Date: 2/28/07

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Holcomb et al.)	
Application No.:	Not Yet Accorded)	Art Unit:
Filing Date:	Not Yet Accorded)	Not Yet Accorded
Title:	COMBINATION DIFFERENTIAL AND ABSOLUTE)	Examiner:
	PRESSURE TRANSDUCER FOR LOAD LOCK)	Not Yet Accorded
	CONTROL)	
Our File No:	16458-050)	



CERTIFICATE OF EXPRESS MAILING UNDER 37 C.F.R. §1.10

To: Assistant Commissioner of Patents
BOX PROVISIONAL PATENT APPLICATION
Washington, D.C. 20231

I hereby certify that the following documents:

1. Provisional Patent Application entitled **COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL**;
2. Five (5) sheets of drawings (Figures 1-6);
3. Provisional Application Cover Sheet (provided in duplicate); and
4. Check No. 77956 in the amount of \$150.00 for Basic Filing Fee.

Return Post Card are being deposited with the United States Postal Service as EXPRESS MAIL POST OFFICE TO ADDRESSEE, postage prepaid, EXPRESS MAIL LABEL NO. EM590190043US in an envelope addressed to: Assistant Commissioner of Patents, Box Provisional Application, Washington, D.C. 20231, on this 22 day of March, 2000.

Sharon L. Hale

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(c).

Docket Number
16458-050

Type a plus sign (+) inside this box [+]

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LAST NAME	FIRST NAME	RESIDENCE (CITY AND EITHER STATE OR FOREIGN COUNTRY)
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TITLE OF INVENTION (200 characters max)

COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL

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ENCLOSED APPLICATION PARTS (check all that apply)

[X] Specification Number of Pages [18] [] Small Entity Status
 [X] Drawings Number of Sheets [5] [] Other (specify)

METHOD OF PAYMENT (check one)

[X] A check or money order is enclosed to cover the provisional filing fees
 [X] The Commissioner is hereby authorized to charge additional filing fees and credit Deposit Account Number: 03-1725
 (a duplicate copy of this form is provided).

Provisional Filing Fee Amount \$150.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

[X] No.

[] Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,

SIGNATURE

DATE

3/22/00

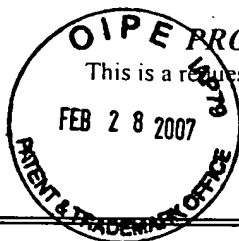
TYPED or PRINTED NAME

KENT A. LEMBKE

REGISTRATION NO. 44,866

[] Additional inventors are being named on separately numbered sheets attached hereto

PROVISIONAL APPLICATION FILING ONLY



This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(c).

Docket Number
16458-050

Type a plus sign (+) inside this box [+]

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MUELLER	JAMES	LONGMONT, COLORADO
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TITLE OF INVENTION (200 characters max)

COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL

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Respectfully submitted,

SIGNATURE

DATE

3/22/00

TYPED or PRINTED NAME

KENT A. LEMBKE

REGISTRATION NO. 44,866

☐ Additional inventors are being named on separately numbered sheets attached hereto

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Express Mail No. EM590190043US

**COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE
TRANSDUCER FOR LOAD LOCK CONTROL**

Invented by:

Garry Holcomb

Youfan Gu

James Stafford

James Mueller

Stacy Wade



BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention is related generally to load lock controls for vacuum processing chambers and more particularly to a combination differential and absolute pressure transducer for load lock control and a method of controlling load locks with such combination differential and absolute pressure transducer.

2. State of the Prior Art:

Vacuum processing in reaction chambers is commonly used to deposit thin films of semiconductor materials, metal, dielectrics, and the like onto substrates in the fabrication of semiconductor devices. Typical processes that utilize such vacuum reaction chambers include chemical vapor deposition (CVD) and physical vapor deposition (PVD) and many variations of such processes, as well as etching processes to clean substrates or remove selected portions of materials. Typically, the vacuum process chamber is evacuated with a vacuum pump to a very low pressure, for example down to 10^{-4} torr, and, in some processes, much lower, such as 10^{-6} or even 10^{-7} torr. When the desired vacuum is attained, feed gases are flowed into the process chamber at desired rates and proportions to react and/or deposit desired materials onto substrate wafers. Heat may be used in some processes, but others are performed at room temperature. When deposition of the desired materials is complete, the wafer is removed from the process chamber and another substrate wafer is inserted into the process chamber, where the deposition process is repeated.

Significant vacuum pumping time is required to pump the process chamber down to the desired pressure, and undesirable contaminants enter the process chamber every time it is opened to atmosphere. Therefore, substantial efforts are made to avoid opening the process chamber to atmosphere and to maintain the process chamber pressure as close to the desired low deposition pressure as possible. Load locks are used, therefore, to facilitate insertion of substrates into the process chambers for deposition and/or etch processing and to remove the wafers from the process chamber while maintaining the vacuum in the process chamber.

A load lock is, essentially, a second vacuum chamber, often smaller in size than the process chamber, and connected to the process chamber by a passage with an interior "door" or large valve that can be opened for insertion and removal of the wafers into and out of the process chamber. When the interior door is closed, it seals the passage so that no air or gas can flow into or out of the process chamber through the passage. The load lock also has an exterior "door" or large valve, which opens the load lock chamber to the atmosphere to allow insertion or removal of wafers into and out of the load lock chamber. When the exterior door is closed, it seals the load lock so that no air or other gas can flow into or out of the load lock chamber.

In operation, the process chamber has its pressure maintained at the desired vacuum by a process chamber vacuum pump. With the interior door of the load lock closed, the exterior door is opened to the atmosphere, so one or more wafer substrate(s) can be inserted into the load lock chamber. With the wafer(s) in the load lock chamber, the exterior door is closed, and a load lock vacuum pump draws the air out of the load lock chamber, until the pressure in the load lock chamber is about as low as the pressure in the process chamber. Then, the interior door is opened, so the wafer substrate(s) can be moved from the load lock chamber, through the passage,

and into the process chamber. When the wafer(s) are in the process chamber, the interior door can be closed while the wafer(s) are processed in the process chamber, i.e., while feed gas is fed into the process chamber and materials are either deposited on, or etched from, the wafer(s). Alternatively, but not preferably, the interior door could be left open during processing.

5 When the processing is complete, the wafer(s) are removed from the process chamber into the load lock chamber. The interior door is then closed to maintain the vacuum in the process chamber, while the pressure in the load lock is brought up to atmospheric pressure by allowing air or an inert gas, such as nitrogen, to flow into the load lock chamber. When the pressure in the load lock chamber is at or near atmospheric pressure, the exterior door is opened
10 to allow removal of the processed wafer(s).

Some more complex process systems have a central transfer chamber with several process chambers branching out from the transfer chamber. In those circumstances, the load lock is usually connected by the passage and interior door to the transfer chamber.

In the past, it has been difficult to control the load lock in an efficient manner.
15 Convection pirani pressure sensors, which have absolute pressure measuring capabilities from about 1,000 torr down to about 10^{-3} torr (atmospheric pressure at sea level is about 760 torr) have been used in pressure transducers adapted to control opening of the doors in load locks. Such control of load lock doors with that type of pressure transducer has been beneficial, but problems persist. For example, the 10^{-3} torr lower pressure measuring limit of the convection pirani
20 sensors is not low enough for effective control of opening the interior door, because the process chambers are usually operated at pressures at least one to three orders of magnitude below that limit, i.e., at 10^{-4} torr or even 10^{-6} torr or lower. Thus, even when the load lock pressure is

pumped down to 10^{-3} torr, opening the interior door causes an undesirable rush of gas molecules, along with any particulate impurities and water vapor they carry along, into the process chamber. It puts a greater load on the vacuum pumps of the process and/or load lock chambers, causing larger pump down times after each opening and closing of the interior door, especially in the process chamber to get the pressure pumped back down to the desired process pressure. Such added pumping overhead adds to the processing time and decreases efficiency.

The problems are even worse on the upper pressure end, i.e., at or near atmospheric pressure (about 760 torr), because there are many more gas or air molecules at that pressure. Thus, opening the exterior door when pressure inside the load lock chamber is not the same as the ambient pressure causes much stronger air currents and is much more contaminating, even when the load lock is in a clean room. Again, convection pirani sensors do have accurate pressure sensing capabilities in the atmospheric range, but it is impossible to set them to control exterior door opening effectively due to constantly changing atmospheric pressure conditions due to weather, altitude, and the like. For example, some manufacturers set the transducer to generate a signal to open the exterior door of the load lock when pressure of the load lock chamber is brought up to 750 torr, thinking it will work for most locations that are slightly above sea level. However, atmospheric pressure in Boulder, Colorado, for example, is about 630 torr, so having a transducer that opens the exterior door when pressure in the load lock chamber reaches 750 torr in Boulder, Colorado, would still have adverse gas current and contamination effects. Resetting such transducers to generate control signals at different pressures is not easy, requires changing software, and is not something that is done by ordinary users.

Therefore, there is a need for better transducer apparatus and for better control methods for controlling the exterior door openings, especially, and also for controlling interior door openings in load locks.

SUMMARY OF THE INVENTION

5 Accordingly, it is a general object of this invention to improve pressure monitoring and control of load locks in semiconductor fabrication process.

Another general object of this invention is to reduce contamination problems during load lock operations.

10 A more specific object of this invention is to provide controls that facilitate opening and closing the interior and exterior doors in load lock operations.

Another more specific object of this invention is to provide a pressure transducer for load lock control that is accurate and functional over the full range of operation from atmospheric pressures to very low evacuation pressures of 10^{-4} or lower.

15 This and other objects, advantages, and novel features of the invention shall be set forth in part in the description that follows, and in part will become apparent to those skilled in the art upon examination of the following description or may be learned by the practice of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

20 The accompanying drawings, which are incorporated in and form a part of the specification, illustrate the preferred embodiments of the present invention, and together with the descriptions serve to explain the principles of the invention.

In the Drawings:

Figure 1 is a perspective view of the combination differential and absolute pressure transducer of this invention;

Figure 2 is a diagrammatic view of a process chamber equipped with a load lock and illustrating the use of the combination differential and absolute pressure transducer of this invention with the load lock;

Figure 3 is a function block diagram of the combination differential and absolute pressure transducer of this invention.;

Figure 4 is a vertical cross-sectional view of a convection pirani pressure sensor used to implement this invention;

Figure 5 is a diagrammatic cross-sectional view of a differential pressure sensor use to implement this invention; and

Figure 6 is an electric circuit diagram of an electric circuit used to implement this invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The combination differential and absolute pressure transducer 10 according to this invention is shown in Figure 1. In general, it comprises an absolute pressure sensor 20 and a differential pressure sensor 30, each of which is connected in gas flow relationship to a common manifold 40. The manifold 40 has a connector 42, such as a pipe fitting, for connecting the manifold 40 to a load lock chamber, which will be discussed below. A circuit board 12 with signal processing and control circuitry, which will be discussed in more detail below, is shown mounted to the absolute pressure sensor 20. A housing 14 containing the absolute pressure

sensor 20 and differential pressure sensor 30 is fastened by a mounting block 15 to the manifold 40. A J1 connector 16 is provided in the housing 14 to accommodate connecting the circuit board 12 to an outside power source, to control actuators (not shown) for the load lock doors (discussed below), and the like. A J2 connector 18 is used to connect the differential pressure output signals to circuit board 12 components.

Referring now to Figure 2 in combination with Figure 1, a load lock 60 is shown connected to a vacuum processing chamber 70 by a passage 61 with an interior door 62. The processing chamber 70 has a vacuum pump 71 to maintain a vacuum, usually in the range of about 1 to 10^{-8} torr. A platform 72 is usually provided to support one or more wafers 73 during processing, such as deposition of semiconductor thin films derived from feed gas sources 74, 75, 76. The load lock 60 also has a vacuum pump 65 to pump down pressure in the load lock chamber 60. A source of gas 63, such as nitrogen, or sometimes air, is used to bring the pressure in the load lock chamber 60 back up to ambient, so the exterior door 64 can be opened to remove and/or insert a wafer 73 from and/or into the load lock chamber 60.

The combination differential and absolute pressure transducer 10 is shown connected in fluid-flow relation to the load lock chamber 60, so that the manifold 40, thus also the absolute pressure sensor 20 and the differential pressure sensor 30, are effectively at the same pressure as the load lock chamber 60. An outside electric power source 82 is shown connected to the circuit board 12 via the J1 connector 16. A process control link 83 between the circuit board 12 and the exterior door 64, via the J1 connector 16, carries control signals from the electric circuit 80 (shown in Figure 6) to a suitable actuator (not shown) or actuator circuit (not shown), such as a solenoid actuator (not shown) to control opening and/or closing the exterior door 64. Such

actuators or actuator circuits for opening and/or closing exterior doors 64 on load lock chambers are well-known to persons skilled in the art and need not be described here for an understanding or enablement of this invention. A process control link 84 between the circuit board 12 and the interior door 62, via the J1 connector 16, carries control signals from the electric circuit (shown in Figure 6) to a suitable actuator (not shown) or actuator circuit (not shown), such as a solenoid actuator (not shown) to control opening and/or closing the interior door 62. Again, such actuators or actuator circuits for opening and/or closing an interior door 62 of a load lock chamber are well-known to persons skilled in the art. Another optional process control link 68, shown in broken lines, can be used to control the vacuum pump's 65 pumping speed by controlling a throttle valve 66. By slowing down the pumping speed, turbulence is reduced in the pumping line 67, thus reducing the particle contamination inside the load lock chamber 60. of the vacuum pump 65, such as a slow pump down speed until the vacuum in the load lock chamber 60 gets down to a certain threshold pressure and then stepping the vacuum pump 65 up to full speed.

As illustrated in the function block diagram in Figure 3, a power supply 91 for the absolute pressure transducer function 90 and a power supply 101 for the differential pressure transducer function 100 are connected to an external power source 82. In the absolute pressure transducer function 90, the absolute pressure sensor 20, such as a standard pirani sensor, which can sense absolute pressure accurately from about 100 torr down to about 10^{-4} torr, senses pressure in the load lock chamber 60. A pirani bridge circuit 92 produces a voltage signal that is indicative of the absolute pressure sensed by the pirani sensor 20. An analog process circuit 93 drives the bridge circuit 92 and amplifies and conditions the voltage signal from the bridge

circuit 92. The relay control circuit 94 utilizes the voltage signal from the process circuit 93 to generate control signals to the interior door 62 actuator to open the door 62 when the pressure in the load lock chamber 60 reaches a certain minimum pressure to match or at least get close to the pressure at which the process chamber 70 (Figure 2) is operated. Alternatively, the control signal from relay control circuit 93 can be used to prevent the interior door 62 from being opened until the minimum threshold pressure in the load lock chamber 60 is reached. Also, as mentioned above, the relay control circuit 94 can also be configured to output a control signal to the throttle valve 66 controller (not shown) to speed up the vacuum pump 65 when the pressure in the load lock chamber gets pumped down to some selected intermediate pressure threshold so as to keep gas flow in the load lock chamber 60 to a minimum during pump down of the load lock chamber 60 when pressure is relatively high. Other absolute pressure sensors could also be used in this invention instead of the pirani sensor 20 described.

The differential pressure transducer function 100 shows the differential pressure sensor 30, which can be, for example, a capacitance manometer pressure sensor. The differential pressure sensor 30, senses differential pressure between the ambient atmospheric pressure and the pressure in the load lock chamber 60, as will be explained in more detail below. The capacitance manometer sensor 30 has a capacitance that varies as a function of the pressure difference between the atmospheric pressure and the load lock chamber 60 pressure, as will be explained in more detail below. The sensor control circuit 103 senses the capacitance of the capacitance manometer sensor 30 and converts the capacitance variance into a voltage signal that is indicative of the pressure differential. The relay control circuit 104 utilizes the voltage signal from the sensor control circuit 103 to output a control signal to the exterior door 64 actuator to

either open the exterior door 64 when a certain pressure differential is reached or to prevent the exterior door 64 from opening until a certain pressure differential is reached. For example, the exterior door 64 could be opened when the differential pressure between the atmosphere and the load lock chamber 60 is zero, i.e., when the load lock chamber 60 pressure and the atmospheric pressure are equal. At such zero differential pressure, there would be very little, if any, flow of air or gas (other than diffusion) either into or out of the load lock chamber 60 when the exterior door 64 is opened. Of course, the relay control circuit 104 could be set to output a control signal at a differential pressure other than zero, if desired.

An example pirani absolute pressure sensor 20 is shown in Figure 4. The pirani sensor 20 comprises a filament 21 enclosed by a tubular container 22, which is connected to the load lock chamber 60 via the manifold 40 (not shown in Figure 4, but indicated by arrow 23). Therefore, the density of gas molecules in the tubular container 22 and surrounding the filament 21 is substantially the same as the density of gas molecules in the load lock chamber 60, which increases as pressure rises and decreases as pressure lowers. An electric current I running through the filament 21 heats the filament 21, and heat dissipation from the filament 21 is a function of the gas density in the tubular container 22 surrounding the filament 21. Specifically, the current I required to maintain the filament 21 at a constant temperature is directly relative to the thermal conductivity and pressure of the gases present in the tubular container 22, thus in the load lock chamber 60. Therefore, as pressure decreases, the voltage V_F across the filament 21 has to be decreased in order to maintain a constant filament 21 temperature. Conversely, as pressure in the load lock chamber 60, thus in the tubular container 22, increases, the voltage V_F required to maintain the filament 21 at a constant temperature increases. The electric leads 24,

25 of the pirani sensor 20 are connected to the bridge circuit 92 (shown in Figures 3 and 6), which, along with a bridge driver circuit in the analog processing circuit 93 (Figures 3 and 6), adjust the voltage V_F as required to maintain the filament 21 at a constant temperature as the pressure in the tubular container 22 thus load lock chamber 60, varies up or down. The voltage V_F , therefore, is indicative of the absolute pressure in the tubular container 22, thus of the absolute pressure in the load lock chamber 60, within a range of about 100 torr to 10^{-4} torr, as mentioned above. Thus, this voltage V_F can be used by the relay control circuit 94 (Figures 3 and 6) to generate and output a signal via process control link 84 at a particular voltage V_F , i.e., at a particular pressure in the load lock chamber 60, to the interior door 62 actuator to open the door 62 or to allow interior door 62 to be opened.

As mentioned above, this invention could be implemented with other kinds of absolute pressure sensors in place of the pirani sensor 20 describe above, such as a thermocouple sensor (not shown) or a convection pirani sensor (not shown). However, the regular pirani sensor 20 described above has advantages in this application. For example, the regular pirani sensor 20 described above is more accurate than a thermocouple sensor, measures over a wider pressure range, and responds more rapidly to pressure changes. A convection pirani sensor is similar to the regular pirani sensor 20 described above, but has a larger tubular container to accommodate gas convection currents around the filament. The gas convection currents increase the range of measurement in higher pressures, but has little effect at lower pressures. For example, where a regular pirani sensor 20 has an accurate pressure measurement range of about 100 torr down to 10^{-4} torr, a convection pirani sensor has a range of about 1,000 torr down to 10^{-3} torr. In the present invention, the lower measurement range of the regular pirani sensor 20, i.e., down to

about 10^{-4} torr, is more important than the higher measurement range of a convection pirani sensor, because the present invention takes care of the higher pressure range control of the exterior door 64 in a different way, as explained below.

Specifically, to avoid problems associated with use of an absolute pressure transducer for controlling the exterior door 64, such as variations of atmospheric pressure at different altitudes and by changing weather patterns, which cause increased risk of contamination of the load lock chamber 60 with each opening of the exterior door 64, thus eventual contamination of the process chamber 70 with subsequent opening of the interior door 62, the pressure transducer 10 of the present invention has a differential pressure sensor 30 for controlling the exterior door 64 opening. Therefore, the higher absolute pressure measuring capability of a convection pirani sensor, i.e., up to 1,000 torr, is not needed.

There are many types of differential pressure sensors, as is well-known in the art, many of which could be used with this invention, including, but not limited to, piezo pressure sensors. However, a particularly useful differential pressure sensor 30 for this application is a capacitance manometer pressure sensor, because it is relatively simple, durable, and very accurate.

As mentioned above, atmospheric pressure at sea level is about 760 torr, which varies with weather patterns, and atmospheric pressures at higher elevation locations are significantly lower than 760 torr, such as about 630 torr in Boulder, Colorado, which also vary with weather patterns. Therefore, any setting of a particular absolute pressure for opening the exterior door hardly ever matches actual ambient atmospheric pressure, thus almost invariably cannot avoid an air inrush or outrush into or out of the load lock chamber 60 upon opening of the exterior door 64.

In contrast, the differential pressure sensor 30 can generate a control signal to open the exterior door 64, or to allow exterior door 64 to be opened, only when the pressure in the load lock chamber 60 equals the ambient atmospheric pressure, regardless of what such ambient atmospheric pressure may be at any particular time or at any particular location or elevation.

5 Thus, the regular pirani pressure sensor 20 described above enables accurate and effective opening of interior door 62 at specific absolute pressures in the load lock chamber 60 down to 10^{-4} torr to match, or at least get reasonably close to, the absolute pressure being maintained in the process chamber 70, which is quite constant and known during processing, while the differential pressure sensor 30 enables accurate and effective opening of the exterior door 64
10 when the load lock chamber 60 pressure matches the ambient atmospheric pressure, regardless of variations of ambient atmospheric pressure from time to time and from one location to another.

A diagrammatic representation of a capacitance manometer differential pressure sensor 30 in cross-section is shown in Figure 5. Essentially, an enclosed manometer chamber 31 is connected in fluid flow relation to the load lock chamber 60 via the manifold 40 (Figures 1 and
15 3) as indicated by arrow 32, so that the pressure in the manometer chamber 31 is substantially the same as the pressure in the load lock chamber 60. One wall 33 of the manometer chamber 31 is thin enough to flex or deform as a diaphragm, as indicated by broken line 33', when atmospheric pressure, indicated by arrow 34, is greater than pressure in the manometer chamber 31, which is indicated by arrow 35. If the atmospheric pressure 34 is equal to the manometer chamber 31
20 pressure 35, then there will be no flexure or deformation 33' of the wall or diaphragm 33. If the atmospheric pressure 34 is less than the manometer chamber 31 pressure 35, the thin wall or diaphragm 33 will flex outwardly, as indicated by broken line 33". The extent of flexure of

deformation 33' or 33" is proportional to the magnitudes of pressure differential between atmospheric pressure 34 and manometer chamber 31 pressure 35. Therefore, measurement of the amount of flexure 33', 33", is indicative of pressure differential between atmospheric pressure 34 and manometer chamber 31 pressure 35.

5 There are many ways to detect and measure the amount of flexure 33', 33", such as with strain gauges, optically, and others that are well-known to persons skilled in the art. In the case of the capacitance manometer sensor 30 illustrated in Figure 5, the flexure 33', 33" of the wall or diaphragm 33 is measured by detecting capacitance between the wall or diaphragm 33 and an adjacent metal plate 36. As is well known in the art, two metal plates, such as the metal wall 33
10 and the plate 36, when separated by a dielectric or an empty space, have a capacitance C when a voltage is applied between them across the dielectric or empty space. Persons skilled in the art also know how to measure capacitances C and changes in capacitance C with a sensor control circuit 103 (Figure 3), and such capacitance manometers 30 are well-known and readily available to persons skilled in the art. Therefore, the differential pressure between the load lock chamber
15 60 pressure 35 and the ambient atmospheric pressure 34, if any, can be measured by measuring the capacitance C between the wall or diaphragm 33 and the plate 36. The capacitance C is used by the relay control circuit 104 (Figure 3) to generate and output a signal via process control link 83, e.g., when the differential pressure is zero (no flexure 33' or 33" in Figure 5) to open the exterior door 64 or to allow exterior door 64 to be opened. The relay control circuit 104 could
20 also be set to generate and output such a control signal to exterior door 64 when the differential pressure is some desired discrete amount more or less than zero.

Thus, it does not matter in this invention what the specific load lock chamber 60 absolute pressure 35 is or what the particular ambient atmospheric pressure 34 is. When the differential pressure between them is some specific amount, such as zero or some other desired set value, the exterior door 64 will open or be allowed to open.

5 A schematic diagram of the electric circuit on the circuit board 12 (Figures 1 and 2) is shown in Figure 6 with the portions of the circuit that comprise pirani sensor 20, pirani bridge circuit 92, analog process circuit 93, relay control circuit 94, and switching power supply 91 outlined with broken lines. Persons skilled in the art will readily understand this electric circuit from the functions and features described, but several salient features can be mentioned. The
 10 basic Wheatstone bridge comprises essentially, the pirani filament 21 between voltage nodes V_0 and V_2 , the resistor R11 between voltage nodes V_0 and V_1 , the resistor R10 between voltage node V_1 and ground node G, and the parallel resistors R12, R13, R14, and R15 between the voltage node V_2 and the ground node G. As pressure in the load lock chamber 60 (Figures 2 and 3), thus gas pressure around the filament 21, decreases, conduction of heat by gas molecules from the
 15 filament 21 decreases. Decrease in heat dissipation from the filament 21 would, in the absence of an adjustment, cause temperature of the filament 21, thus resistance of the filament 21, to increase. An increase in resistance of the filament 21 would change current flow in the bridge circuit 92 and cause the bridge voltages V_1 and V_2 to become unbalanced, i.e., V_1 would not equal V_2 , which is detected by a voltage comparator 110 in the analog process circuit 93. In
 20 response, the transistor controller 112 in the analog process circuit 93 lowers the voltage V_0 in the bridge circuit 92, which lowers the voltage V_F across the filament 21, thus lowers current flow I through the filament 121. The lower current I in filament 21, lowers heat production in

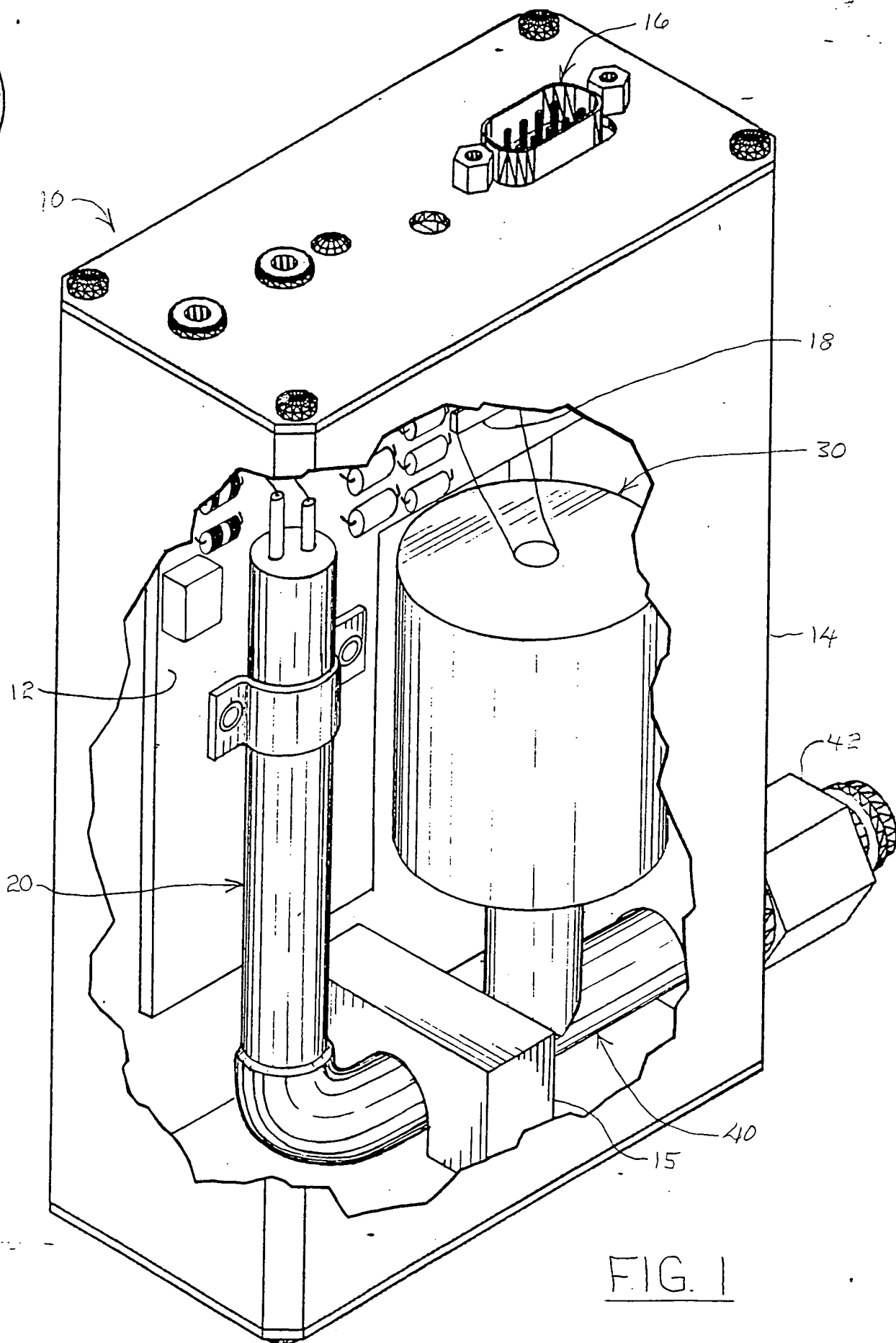
the filament 21, because production of heat requires power, and power equals I^2R . Less heat production means temperature of the filament 21 comes back down, thus resistance of the filament 21 comes back down, which readjusts current flow in the bridge circuit 92 back in balance, i.e., $V_1 = V_2$ again. Conversely, when load lock chamber 60 pressure, thus pressure
5 around the filament 21, increases, more gas molecules conduct more heat away from the filament 21, which, in the absence of an adjustment, would lower temperature, thus resistance, of the filament 21. Lower resistance in filament 21 would change current flow in the bridge circuit 92, thus causing the bridge circuit 92 to become unbalanced, i.e., V_1 would not equal V_2 . Again, such imbalance is detected by the voltage comparator circuit 110, which causes the transistor
10 controller 112 to increase V_0 . The increased V_0 increases V_F across the filament to increase current I in the filament, which increases power (I^2R) to raise the temperature, thus resistance, of filament 21, to put the bridge circuit 92 back into balance, i.e., $V_1 = V_2$. Consequently, with these adjustments of the voltage V_0 , the temperature of the filament 21 is kept constant. Further, such decreases and increases of the voltage V_0 required to maintain the filament 21 temperature
15 constant, as explained above, are indicative of changes in load lock chamber 60 pressure. Thus, the voltage V_0 can be monitored electronically and used to actuate the relay control circuit 94 to generate and output a control signal to open the interior door 62, or to allow the interior door 62 to be opened, at some selected minimum load lock chamber 60 pressure level that matches or is near the pressure maintained in the process chamber 70. Optionally, as mentioned above, the
20 voltage V_0 could be used to actuate the relay control circuit 94 to generate and output a control signal to increase speed of the vacuum pump 65 after the load lock chamber 60 pressure is drawn down to some desired intermediate load lock chamber 60 pressure threshold.

A potentiometer 114 in the relay control circuit 94 is used to set the voltage level at which V_0 will actuate a transistor 120 to actuate the relay 130 to generate the control signal to open the inner door 62 or to allow the inner door 62 to be opened (optionally to increase speed of the vacuum pump 65). A comparator 118 compares V_0 from the analog process circuit 93 to a voltage on lead 116 set by the potentiometer 114 to actuate the switch 120, thus actuating the relay 130. A failsafe circuit 122 also monitors the bridge voltage, such as V_2 , and, if it is not within a proper range or level, such as would happen if the filament 21 would break, a transistor switch 124 is actuated to prevent the relay 130 from being actuated.

The switching power supply 91 provides power at 134 for the pirani sensor 20, the bridge circuit 92, the analog processing circuit 93, and relay control circuit 134. The J1 and J2 pins marked "TO MKS SWITCH" in Figure 6 show the connections of the capacitance manometer 30 (Figures 1 and 4) to the circuit board 12 (Figure 1). Since, as mentioned above, capacitance manometers that can be set to trip at pressures in relation to atmospheric pressure have been well-known and available commercially for many years (e.g., BARATRON™ Atmospheric Switches manufactured by MKS Instruments, Inc., Andover, Massachusetts 01810-2449), a detailed description of power supply 101, sensor control circuit 103, or relay control circuit 104 shown in the function block diagram of Figure 3 is not necessary to the understanding or implementation of this invention.

The foregoing description is considered as illustrative only of the principles of the invention. Furthermore, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and process shown and described above. Accordingly, resort may be made to all suitable modifications and

equivalents that fall within the scope of the invention. The words "comprise," "comprises,"
"comprising," "include," "including," and "includes" when used in this specification are intended
to specify the presence of stated features, integers, components, or steps, but they do not preclude
the presence or addition of one or more other features, integers, components, steps, or groups
5 thereof.



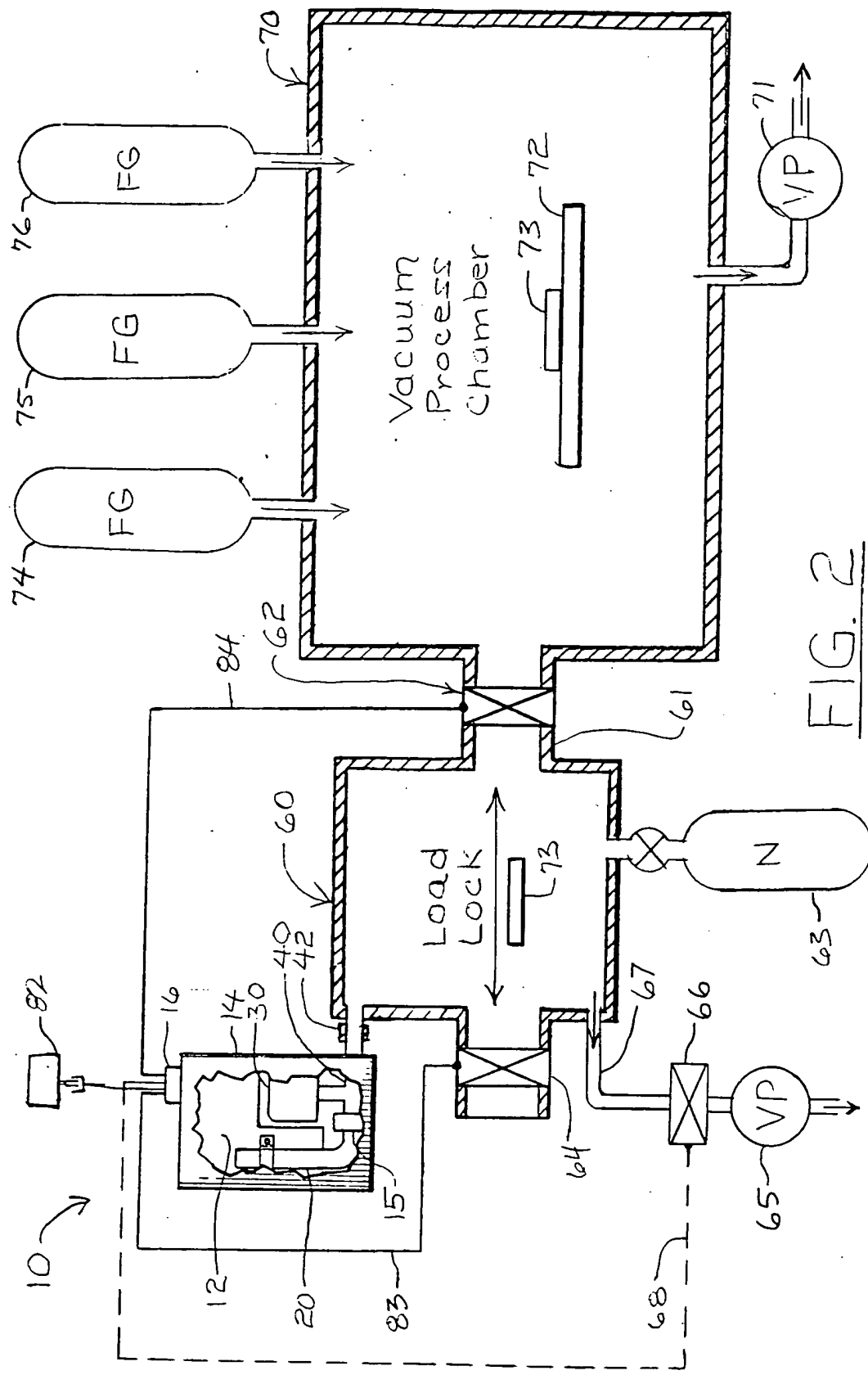


FIG. 2

Loadlock Transducer Functional Block Diagram

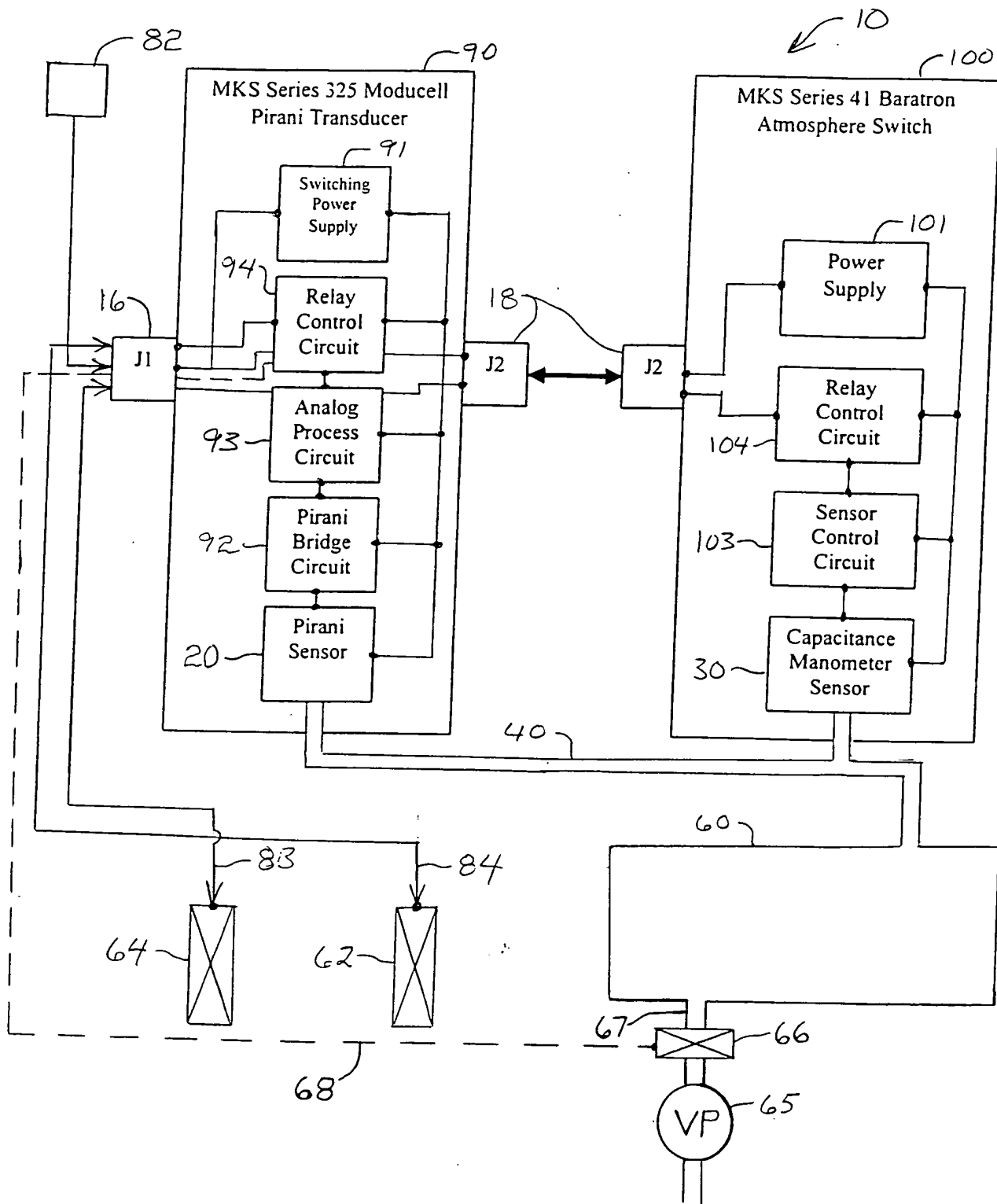


FIG. 3

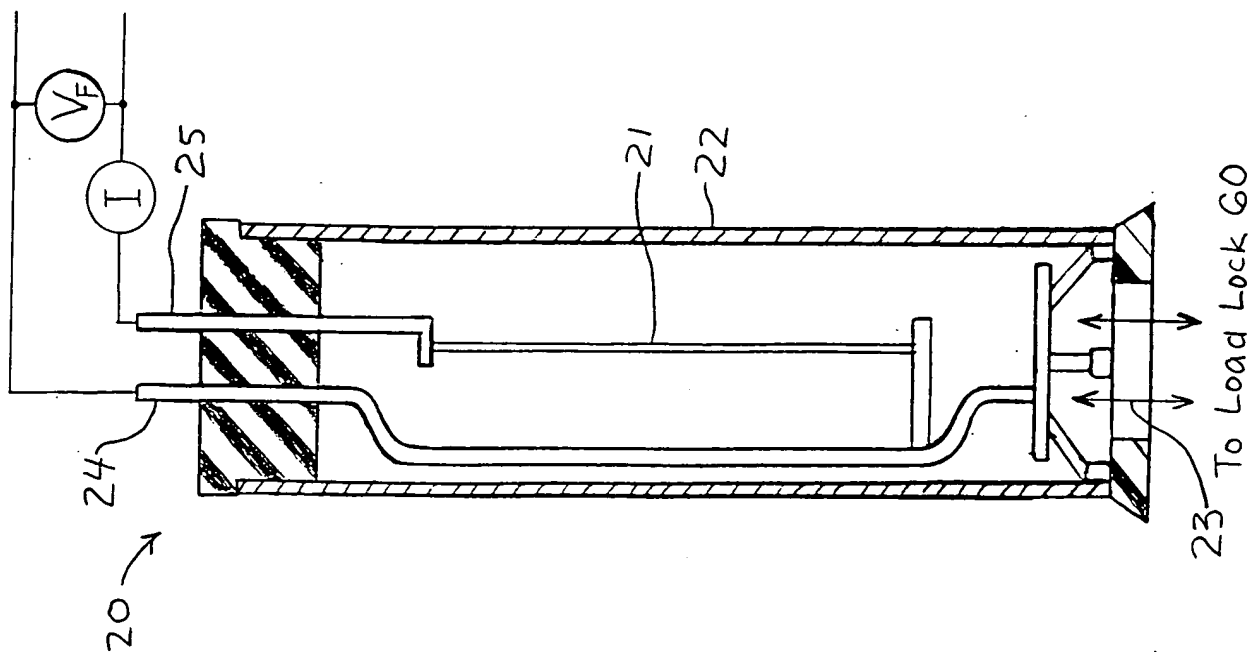


FIG. 4

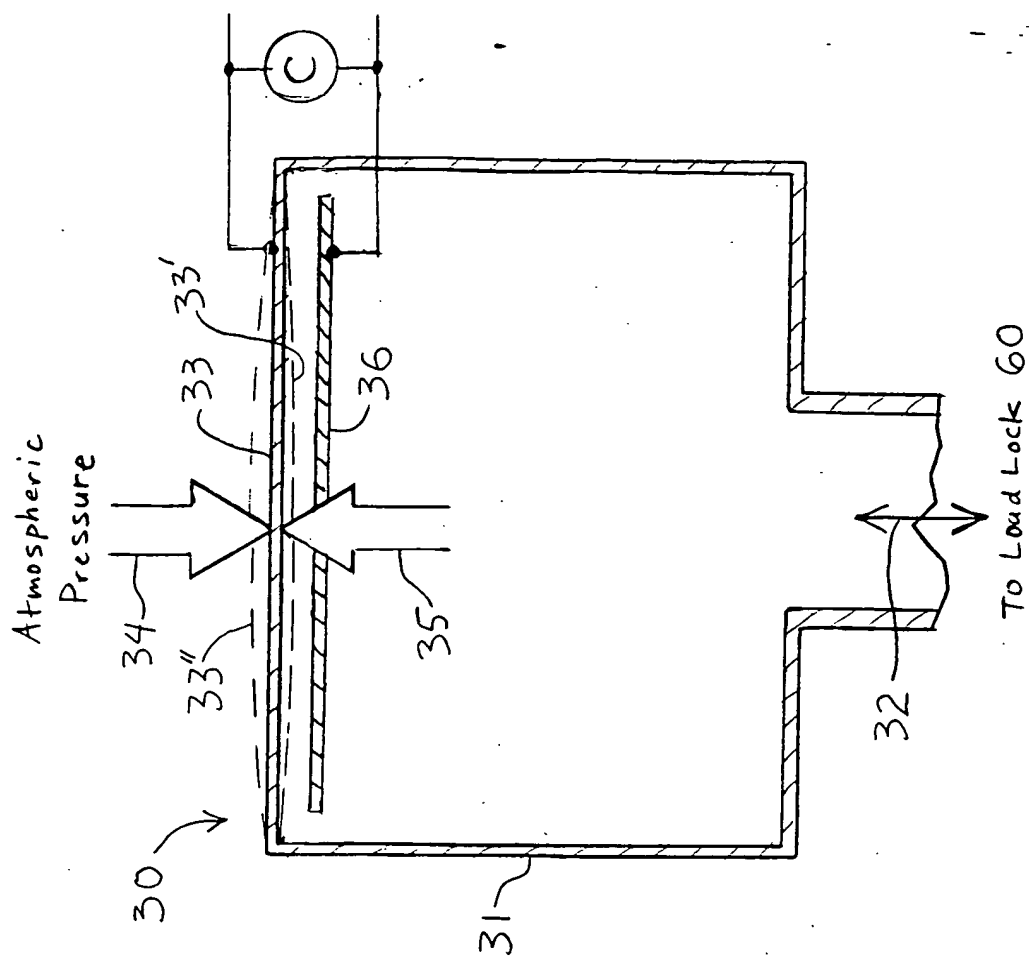
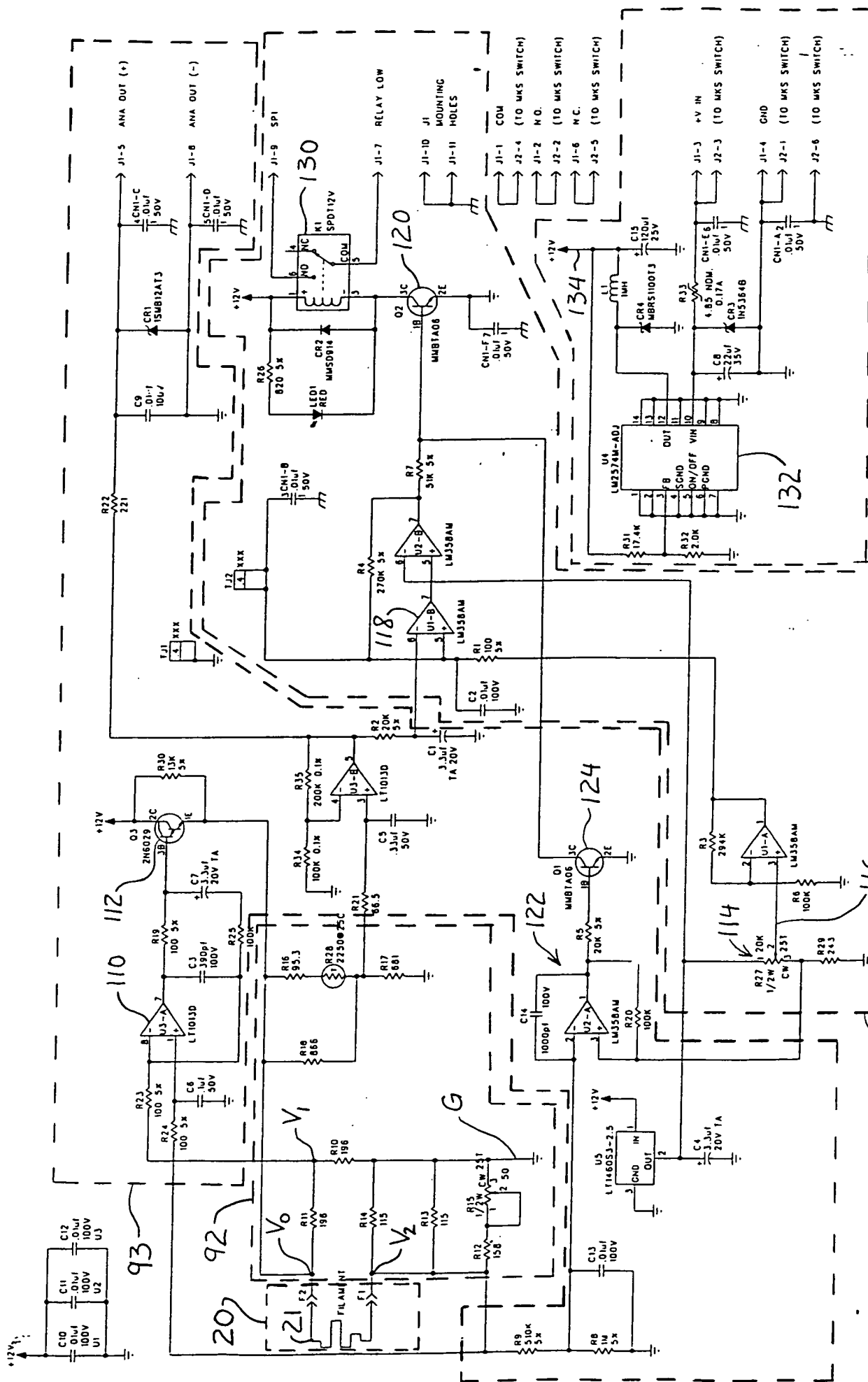


FIG. 5



10

16

7, 176

Applicants: Holcomb et al.
Serial No.: Not Yet Assigned
Filing Date: March 22, 2000
Examiner: Not Yet Assigned
Title: COMBINATION DIFFERENTIAL AND ABSOLUTE
PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL
Our File No.: 16458-050
ITEMS ENCLOSED: 1. Certificate of Mailing ; 2. Provisional
Patent Application; 3. Five (5) sheets of drawings (Figures 1-6);
4. Provisional Application Cover Sheet; and 5. Check No. 77956 in
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Our File No.: 16458-50 / JRY

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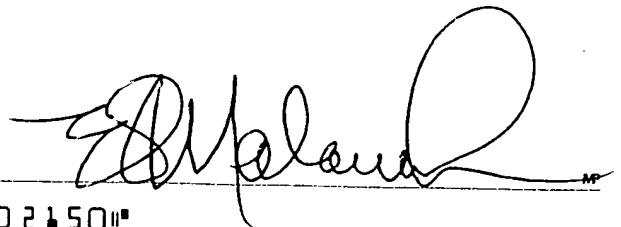
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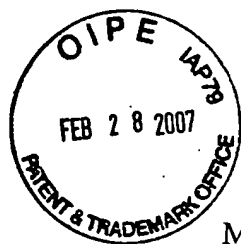


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CHRISMAN BYNUM & JOHNSON

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March 21, 2001

Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

Re: U.S. Application: COMBINATION DIFFERENTIAL AND ABSOLUTE
PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL
Applicants: Holcomb et al.
Atty. File No.: 16458.050



Dear Sir:

The enclosed Patent Application of the above-referenced inventors is being filed by **EXPRESS MAIL POST OFFICE TO ADDRESSEE** (Label No. **EM590191945US**) with the specification, claims, abstract, and drawings which are sufficient to obtain a filing date under 37 C.F.R. 1.53 of the Patent Office Rules. The applicants will complete the application by submitting the required filing fee and declarations within the time allowed under 37 C.F.R. 1.53.

This application is a non-provisional of provisional application Serial Number 60/191,223, filed on March 22, 2000.

The correspondence address for purposes of Rule 1.53 is as follows:

James R. Young, Reg. No. 27,847
Attorney for Applicants
Chrisman, Bynum & Johnson, P.C.
1900 Fifteenth Street
Boulder, CO 80302
Telephone: (303) 546-1300

Sincerely,

Thomas C. Folsom

TCF/stb
Enclosures



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APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/815,376	03/21/2001	1763	0.00	16458.050	5	9	5

CONFIRMATION NO. 3939

FILING RECEIPT



OC00000006076923

James R. Young
Attorney for Applicants
Chrisman, Bynum & Johnson, P.C.
1900 Fifteenth Street
Boulder, CO 80302

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Applicant(s)

Garry Holcomb, Residence Not Provided;
Youfan Gu, Residence Not Provided;
James Stafford, Residence Not Provided;
James Mueller, Residence Not Provided;
Stacy Wade, Residence Not Provided;

Domestic Priority data as claimed by applicant

THIS APPLN CLAIMS BENEFIT OF 60/191,223 03/22/2000

Foreign Applications

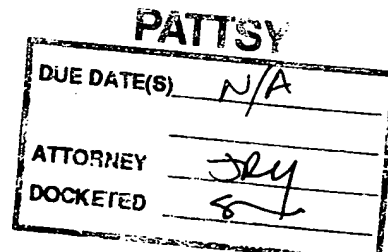
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Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

Title



Combination differential and absolute pressure transducer for load lock control

Preliminary Class

118

Data entry by : YOSEPH, LETEYESUS

Team : OIPE

Date: 05/15/2001



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APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
60/191,223	03/22/2000		150	16458-050	5		

James R Young
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Boulder, CO 80302

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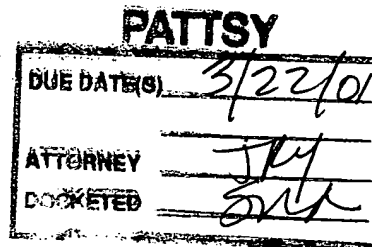
Applicant(s)

Garry Holcomb, Boulder, CO ;
Youfan Gu, Boulder, CO ;
James Stafford, Golden, CO ;
James Mueller, Longmont, CO ;
Stacy Wade, Boulder, CO ;

Continuing Data as Claimed by Applicant

Foreign Applications

If Required, Foreign Filing License Granted 05/09/2000



Title

Combination differential and absolute pressure transducer for load lock control

Preliminary Class

Data entry by : YON, LOWUAN

Team : OIPE

Date: 05/09/2000



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- The words "new," "improved," "improvements in" or "relating to" are not included as first words in the title of an application because a patent application, by nature, is a new idea or improvement.
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- The docket number allows a maximum of 25 characters.
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DECLARATION FOR PATENT APPLICATION

DOCKET NUMBER (Optional)

16458-050

As a below named inventor, I hereby declare that: **FEB 28 2007**

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL**, the specification of which is attached hereto unless the following box is checked:

☒ was filed on 3/21/01 as United States Application Number or PCT International Application Number 09/815,376 and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Prior Foreign Applications(s)	Priority Claimed	Priority Claimed
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)

Priority Claimed
[] Yes [] No

[] Yes [] No

[] Yes [] No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT International filing date of this application.

<u>60/191,223</u>	<u>3/22/00</u>	<u>Pending</u>
(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)
_____ (Application Number)	_____ (Filing Date)	_____ (Status - patented, pending, abandoned)

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

JAMES R. YOUNG, Reg. No. 27,847; THOMAS C. FOLSOM, Reg. No. 35,514; DANIEL N. FISHMAN, Reg. No. 35,512; DAVID J. LEE, Reg. No. 41,935; DONALD M. DUFT, Reg. No. 17,484; MICHAEL J. SETTER, Reg. No. 37,939; EUGENE G. KIM, Reg. No. 46,267; and BRETT L. BORNSSEN, Reg. No. 46,566.

Address all telephone calls to **JAMES R. YOUNG** at telephone number **(303) 546-1300**
 Address all correspondence to **JAMES R. YOUNG**
CHRISMAN, BYNUM & JOHNSON
1900 FIFTEENTH STREET
BOULDER, COLORADO 80302

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor (given name, family name) Garry Holcomb

Inventor's signature *Garry Holcomb* Date 4/27/01

Residence 4425 Brookfield, Boulder, Colorado 80303 Citizenship U.S.A.

Post Office Address same

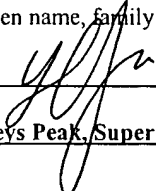
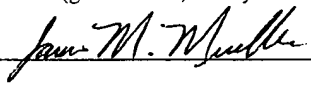
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All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

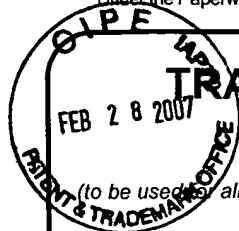
Full name of second inventor (given name, family name) Youfan GuInventor's signature  Date 4-27-01Residence 3322 West Torreys Peak, Superior, CO 80027 Citizenship U.S.A.Post Office Address sameFull name of third inventor (given name, family name) James StaffordInventor's signature  Date 6/15/01Residence 25751 Village Circle, Golden, Colorado 80401 Citizenship U.S.A.Post Office Address sameFull name of fourth inventor (given name, family name) James M. MuellerInventor's signature  Date 4/27/01Residence 907 Acadia Avenue, Lafayette, CO 80026 Citizenship U.S.A.Post Office Address sameFull name of fifth inventor (given name, family name) Stacy WadeInventor's signature  Date 30 April 2001Residence 206 Valley Vista Lane, Boulder, CO 80302 Citizenship U.S.A.Post Office Address same

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		Attorney Docket Number 16458-050
		Total Number of Pages in This Submission 12
		Application Number 09/815,376
		Filing Date 03/21/2001

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Signature	
Date	June 18, 2001

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Applicants: Holcomb et al.
Serial No.: 09/815,376
Filing Date: March 21, 2001
Examiner: Not Yet Assigned
Title: COMBINATION DIFFERENTIAL AND ABSOLUTE
PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL
Our File No.: 16458-050

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2. Fee transmittal (1 sheet);
3. Check No. 81*** for \$920.00;
3. Notice to File Missing Parts of Application (2 sheets);
4. Oath/Declaration (2 sheets);
5. Five sheets of drawings (Figures 1-6);
6. Abstract (1 sheet).

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APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/815,376	03/21/2001	1763	920	16458.050	5	9	4

CONFIRMATION NO. 3939

UPDATED FILING RECEIPT



OC000000006287596

James R. Young
Attorney for Applicants
Chrisman, Bynum & Johnson, P.C.
1900 Fifteenth Street
Boulder, CO 80302

Date Mailed: 07/12/2001

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Garry Holcomb, Boulder, CO;
Youfan Gu, Superior, CO;
James Stafford, Golden, CO;
James M. Mueller, Lafayette, CO;
Stacy Wade, Boulder, CO;

Domestic Priority data as claimed by applicant

THIS APPLN CLAIMS BENEFIT OF 60/191,223 03/22/2000

Foreign Applications

If Required, Foreign Filing License Granted 05/14/2001

Projected Publication Date: 10/18/2001

Non-Publication Request: No

Early Publication Request: No

PATTSY

DATE	9/21/02
ATTORNEY	JHY
DOCKETED	5

Title

Combination differential and absolute pressure transducer for load lock control

Preliminary Class

118

Data entry by : GIZAW, ASTER

Team : OIPE

Date: 07/12/2001



**LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15**

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

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NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

PLEASE NOTE the following information about the Filing Receipt:

- The articles such as "a," "an" and "the" are not included as the first words in the title of an application. They are considered to be unnecessary to the understanding of the title.
- The words "new," "improved," "improvements in" or "relating to" are not included as first words in the title of an application because a patent application, by nature, is a new idea or improvement.
- The title may be truncated if it consists of more than 500 characters (letters and spaces combined).
- The docket number allows a maximum of 25 characters.
- If your application was submitted under 37 CFR 1.10, your filing date should be the "date in" found on the Express Mail label. If there is a discrepancy, you should submit a request for a corrected Filing Receipt along with a copy of the Express Mail label showing the "date in."
- The title is recorded in sentence case.

Any corrections that may need to be done to your Filing Receipt should be directed to:

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/815,376	03/21/2001	Garry Holcomb	16458.050	3939
28286	7590	03/24/2003		

IP PATENTS
FAEGRE & BENSON LLP
1900 FIFTEENTH STREET
BOULDER, CO 80302

Faegre & Benson LLP

MAR 28 2003

REV
RECEIVED

EXAMINER

STRIMBU, GREGORY J

ART UNIT

PAPER NUMBER

3634

DATE MAILED: 03/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PATTSY

DUE DATE(S)	Response to P.A. due 6/24/03
ATTORNEY	REV
DOCKETED	REV

IDS

Office Action Summary

Application No.

09/815,376

Applicant(s)

HOLCOMB ET AL.

Examiner

Gregory J. Strimbu

Art Unit

3634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Specification

The abstract of the disclosure is objected to because "method" on line 1 is confusing since it is unclear what type of method the applicant is referring to. Is the applicant referring to a method of use? On line 3, "a load lock chamber" is confusing since it is unclear if the applicant is referring to the load lock chamber set forth above or is attempting to set forth another chamber in addition to the one set forth above. On line 4, "provides" is confusing since it is unclear what element of the invention provides the control signals the applicant is referring to. On line 4, it is suggested that the applicant change "from" to --between-- and "into" to --and-- to avoid confusion. On line 5, "between ambient atmosphere is grammatically awkward and confusing. On line 6, "transducer" is confusing since it is unclear if the applicant is referring to the transducer apparatus set forth above or is attempting to set forth a transducer in addition to the apparatus set forth above. On line 7, "of load lock chamber pressure" is grammatically awkward and confusing. Finally, it is suggested that the applicant amend the abstract to more clearly set forth the environment in which the transducer apparatus is utilized. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Recitations such as "In load lock apparatus" on line 1 of claim 1 render the claims indefinite because they are grammatically incorrect and confusing. Recitations such as "(1)" on line 3 should be deleted to avoid confusion. Recitations such as "pressure in the manifold" on line 17 of claim 1 render the claims indefinite because it is unclear if the applicant is referring to the pressure in the manifold set forth above or is attempting to set forth another pressure in the manifold in addition to the one set forth above. Recitations such as "capable of sensing absolute pressure" on line 20 of claim 1 render the claims indefinite because it is unclear what element of the invention has the absolute pressure the applicant is referring to. Recitations such as "the to the" on line 32 of claim 1 render the claims indefinite because they are grammatically incorrect.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

It should be noted that claims 4-7 have been interpreted as reciting only the subcombination of the combination differential and absolute pressure transducer apparatus. Accordingly, claims 4 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Eberhardt et al. Eberhardt et al. discloses a combination differential and absolute pressure transducer apparatus comprising a differential pressure sensor 34 that is capable of sensing a pressure difference between a first side of the differential

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pressure sensor and a second side of the differential pressure sensor, the differential pressure sensor being connected in fluid flow relation to the load lock chamber 14 and mounted such that the first side is exposed to the ambient atmospheric pressure in a room and such that the second side is exposed to pressure in the load lock chamber, a differential pressure transducer circuit (not numbered, but see column 15, line 21) connected to the differential pressure sensor and which is capable of generating an exterior door control signal at a preset differential pressure value, an absolute pressure sensor 36 that is capable of sensing absolute pressure, the absolute pressure sensor being connected in fluid flow relation to the load lock chamber 14 in such a manner that the absolute pressure sensor is exposed to pressure in the load lock chamber, an absolute pressure transducer circuit (not numbered, but see column 15, line 21) connected to the absolute pressure sensor and which is capable of generating an interior door control signal at a preset absolute pressure value.

Claim Rejections - 35 USC § 103

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eberhardt et al. as applied to claims 4 and 5 above, and further in view of Stocker. Stocker discloses an absolute pressure sensor comprising a pirani sensor.

It would have been obvious to one of ordinary skill in the art to provide Eberhardt et al. with a pirani sensor, as taught by Stocker, to increase the accuracy of the absolute pressure sensor.

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Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eberhardt et al. as applied to claims 4 and 5 above, and further in view of Gianchandani.

Gianchandani discloses a capacitance manometer pressure sensor.

It would have been obvious to one of ordinary skill in the art to provide Eberhardt et al. with a capacitance manometer pressure sensor, as taught by Gianchandani, to increase the accuracy of the differential pressure sensor.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Brucker, Ferenczi et al. and Rannenberg et al. are cited for disclosing the use of pressure sensors to control the pressure in a chamber. Kato et al., Nakagawa et al., Shirai, Kroeker, Fukasawa et al. and Arie are cited for disclosing a load lock having at least two doors.

Allowable Subject Matter

Claims 1-3, 8 and 9 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record, absent applicant's own disclosure, fails to teach the entire combination of elements set forth in the claimed invention. Specifically, the prior art of record fails to teach the combination of a load lock apparatus having a combination differential and absolute pressure transducer with a manifold connected in fluid flow relation to the load lock chamber, a differential pressure sensor such that the

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first side is exposed to the ambient atmospheric pressure in the room and the second side is exposed to the pressure in the manifold, an absolute pressure sensor being connected to the manifold such that the absolute pressure sensor is exposed to the pressure in the manifold, an exterior door control link connected between the differential pressure transducer circuit and the exterior door actuator, and an interior door control link connected between the absolute pressure transducer circuit and the interior door actuator. See lines 10-30 of claim 1. The prior art of record also fails to teach a method of automatically controlling a load lock comprising the steps of comparing the differential pressure reference voltage to the transducer voltage that corresponds in value to the differential pressure, and, when the transduced voltage equals the differential pressure reference voltage, producing the exterior door control signal and delivering the exterior door control signal to the exterior door actuator and comparing the absolute pressure reference voltage to the transduced voltage that corresponds in value to the absolute pressure, and, when the transduced voltage equals the absolute pressure reference voltage, producing the exterior door control signal and delivering the interior door control signal to the interior door actuator. See lines 16-19 and 30-33 of claim 8 and lines 13-16 and 18-21.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory J. Strimbu whose telephone number is 703-305-3979. The examiner can normally be reached on Monday through Friday 8:00 to 4:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel P. Stodola can be reached on 703-308-2686. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3597 for regular communications and 703-305-3597 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-2168.

A handwritten signature in black ink, appearing to read "Gregory J. Strimbu", with a long horizontal flourish extending to the right.

Gregory J. Strimbu
Primary Examiner
Art Unit 3634
March 12, 2003

Notice of References Cited	Application/Control No. 09/815,376	Applicant(s)/Patent Under Reexamination HOLCOMB ET AL.	
	Examiner Gregory J. Strimbu	Art Unit 3634	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,018,932	02-2000	Eberhardt et al.	53/432
	B	US-5,475,623	12-1995	Stocker, Rudolf	702/98
	C	US-6,470,754	10-2002	Gianchandani, Yogesh B.	73/718
	D	US-5,223,229	06-1993	Brucker, Jeffrey P.	422/116
	E	US-6,064,311	05-2000	Ferenczi et al.	340/618
	F	US-5,129,348	07-1992	Rannenberg et al.	114/333
	G	US-5,445,484	08-1995	Kato et al.	414/217
	H	US-5,445,491	08-1995	Nakagawa et al.	414/805
	I	US-6,186,722	02-2001	Shirai, Hidenobu	414/217
	J	US-6,250,869	06-2001	Kroeker, Tony R.	414/221
	K	US-5,611,655	03-1997	Fukasawa et al.	414/217
	L	US-4,797,054	01-1989	Arii, Katsuyuki	414/217
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



**Supplemental Application Data Sheet accompanying
Petition Under 37 CFR 1.183**

FEB 28 2007

PTO/SB/14 (02-07)

Approved for use through 02/28/2007. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Supplemental Application Data Sheet 37 CFR 1.76		Attorney Docket Number	16458.050
		Application Number	09/815,376
Title of Invention	COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2

- ☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1					
Applicant Authority		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	
				<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix	
Mr.	Garry		Holcomb		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Boulder	State/Province	CO	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i		US			
Mailing Address of Applicant:					
Address 1		4425 Brookfield			
Address 2					
City	Boulder	State/Province	CO		
Postal Code	80303	Country i	US		
Applicant 2					
Applicant Authority		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	
				<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix	
Dr.	Youfan		Gu		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Superior	State/Province	CO	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i		US			
Mailing Address of Applicant:					
Address 1		3322 West Torreys Peak			
Address 2					
City	Superior	State/Province	CO		
Postal Code	80027	Country i	US		
Applicant 3					
Applicant Authority		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	
				<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix	
Mr.	James		Stafford		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Golden	State/Province	CO	Country of Residence i	US

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Supplemental Application Data Sheet 37 CFR 1.76		Attorney Docket Number	16458.050
		Application Number	09/815,376
Title of Invention	COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL		

Citizenship under 37 CFR 1.41(b) i		US	
Mailing Address of Applicant:			
Address 1		25751 Village Circle	
Address 2			
City	Golden	State/Province	CO
Postal Code	80401	Countryⁱ	US
Applicant 4			
Applicant Authority		<input checked="" type="radio"/> Inventor <input type="radio"/> Legal Representative under 35 U.S.C. 117 <input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name
Mr.	James	M.	Mueller
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service			
City	Lafayette	State/Province	CO
Country of Residence i		US	
Citizenship under 37 CFR 1.41(b) i		US	
Mailing Address of Applicant:			
Address 1		907 Acadia Avenue	
Address 2			
City	Lafayette	State/Province	CO
Postal Code	80026	Countryⁱ	US
Applicant 5			
Applicant Authority		<input checked="" type="radio"/> Inventor <input type="radio"/> Legal Representative under 35 U.S.C. 117 <input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name
Mr.	Stacy		Wade
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service			
City	Boulder	State/Province	CO
Country of Residence i		US	
Citizenship under 37 CFR 1.41(b) i		US	
Mailing Address of Applicant:			
Address 1		206 Valley Vista Lane	
Address 2			
City	Boulder	State/Province	CO
Postal Code	80302	Countryⁱ	US
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add			

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.	
Customer Number	27479

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Supplemental Application Data Sheet 37 CFR 1.76		Attorney Docket Number	16458.050
		Application Number	09/815,376
Title of Invention	COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL		
Email Address	jamesy@patentlegal.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL		
Attorney Docket Number	16458.050	Small Entity Status Claimed	<input type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	5	Suggested Figure for Publication (if any)	1
Publication Information:			
<input type="checkbox"/> Request Early Publication (Fee required at time of Request 37 CFR 1.219)			
<input type="checkbox"/> Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not been and will not be the subject of an application filed in another country, or under a multilateral agreement, that requires publication at eighteen months after filing.			

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.			
Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> US Representative (37 CFR 11.9)
Customer Number	27479		

Domestic Priority Information:

This section allows for the applicant to claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c). Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.			
Prior Application Status	Expired	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
09815376	non provisional of	60191223	2000-03-22
Additional Domestic Priority Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Supplemental Application Data Sheet 37 CFR 1.76		Attorney Docket Number	16458.050
		Application Number	09/815,376
Title of Invention	COMBINATION DIFFERENTIAL AND ABSOLUTE PRESSURE TRANSDUCER FOR LOAD LOCK CONTROL		

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

Application Number	Country ⁱ	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			<input type="radio"/> Yes <input checked="" type="radio"/> No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1

If the Assignee is an Organization check here. ☒

Organization Name MKS Instruments, Inc.

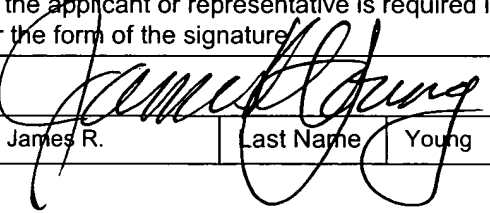
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A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature			Date (YYYY-MM-DD)	2007-02-28	
First Name	James R.	Last Name	Young	Registration Number	27847

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



**Certificate of Correction accompanying alternative
Petition Under 37 CFR 1.78(a)(3)**

**UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION**Page 1 of 1

PATENT NO. : 7,076,920

APPLICATION NO.: 09/815,376

ISSUE DATE : July 18, 2006

INVENTOR(S) : Holcomb et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, line 5, insert -- REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of prior Application No. 60/191,223, filed March 22, 2000.--

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Cochran Freund & Young
2026 Caribou Drive, Suite 201, Fort Collins, CO 80525

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